Lab Reports for Physics

Lab reports should have 5 parts:
Title, Materials, Procedure, Observations, and Conclusions.

Title: It should indicate the purpose of the lab. The title should a contain a noun and verb, but does not necessarily have to form a complete sentence.

Example: " *To determine the maximum speed of a marble rolling down an inclined plane at various angles.*"

Materials: a simple list of lab equipment separated by commas. For example, *Materials: marble, wooden ramp, stopwatch, ruler, protractor.*

Procedure:

Tell what you **did** in the lab, both physically and mathematically, to collect your data and arrive at your results. The purpose of this section is to give the reader enough information to precisely repeat your experiment.

Scientific writing is different than prose. It is always done in the **past tense** and **passive voice** (a.k.a. "in the third person").

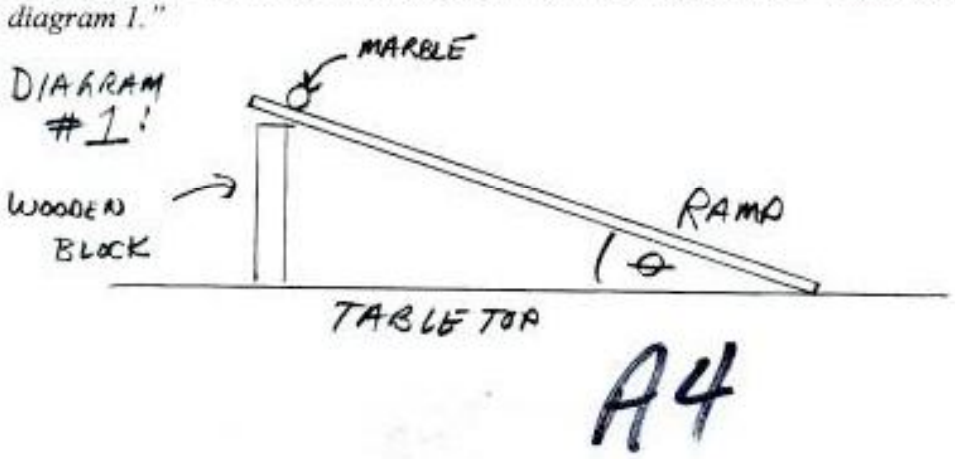
Example: *"The ramp was made by leaning a wooden plank against the classroom wall at an angle of ten degrees to the table top. The angle was measured using a protractor. The marble was allowed to roll from the top of the ramp. The time elapsed in rolling to the bottom was measured using a stop watch."*

Notice that *"I"*, *"we"*, *"the class"*, and *"you"* do not appear as the subjects in the procedure sentences. The things used (such as *the ramp, the marble*, and *time*) and actions done are the subjects of our sentences. There is no mention of the people involved in the experiment. You will find yourself using *was* and *were* in many of the sentences of your procedure.

The procedure is written in paragraph form properly using the margin. Sentences should be short. *Economy of language* is highly valued in scientific writing, i.e., saying things in as brief and concise a language as possible while still getting the procedure across clearly and completely to the reader.

At least one labeled diagram is required in each paragraph , and you can refer to it in your procedure.

Example: *"The ramp was inclined on the a tabletop on a 10° angle as shown in diagram 1."*



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Observations:

Angle (°)	time (sec)
10	12.0
20	11.5
30	10.4
40	8.9
50	7.0
60	5.0
70	4.8
80	3.2

This section reports what you saw and measured in the lab. Sentences and paragraphs are not required here, especially if a table or graph presents the information more clearly and concisely. Some text is always required to tell the reader what he or she is looking at; headings, captions, and units of measurements are needed to give numbers physical meaning.

Conclusions:

Give your final results, draw a conclusion, or make an inference from the observations made in the experiment. *Ex: "The ball was found to reach a maximum speed of 4.5×10^2 m/s. Velocity increased as the inclined angle of the ramp was increased.* " Notice that the final result is expressed in scientific notation, and should be rounded to the appropriate number of significant digits. If results are inconclusive or dubious, briefly speculate on the possible sources of error or problems.

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Neatly write or type the good copy of your lab report. Use margins well. If you have access to a word processor and/or spreadsheet, you can use them for text and tables, since they allow you to edit easily. Graphics drawn free-hand should be done with a ruler.

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Scoring Rubric for Lab Reports

A scrap copy of all labs is to be done during class in the laboratory notebook and saved for notebook- folder check. A final draft should be done on loose-leaf, and will be scored as follows:

Heading: 5 points

(along top of page: name, lab #, date, score 2 points each up to 5)

Title (aka: objective, goal, hypothesis etc) 5 points

Does the title communicate what you are doing in this lab? (2 points)
Does it have at least a noun and a verb? (2 points)
No title? (0/5)

Materials: 10 points

A list separated by commas (2 pts each item of up to 10 pts)

Procedure: (aka: experimental section, methods, protocol) 40 points

30 points: A **paragraph** written in the past tense, passive voice explaining what was done, with enough explanation to reproduce the entire experiment.
10 points: Labled **diagram** of apparatus used: 5 pts for labels, 5 pts for the drawing.

Observations (aka data, measurements, tables, calculations) 30 points

Format varies: a list, table, chart, descriptive sentences, calculations.
All numbers need units (-1 each missing unit up to 5 points)
Measurements should have the maximum # of significant digits (up to 5 pts)
Missing or incorrect data or observations (% of 30 pts missing)

Conclusions (aka results, discussion, analysis) 10 points

At least one true conclusion that flows from logically the observations in a complete sentence, in the past tense and passive voice. Occasionally, the teacher may specify that two or more independent conclusions or some error analyses are needed in some labs. Numerical conclusions need to be written in scientific notation and using significant digits.

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Other factors involving score:

Grammar, capitalization and spelling errors: -1 per occurrence.

Lateness: later that day, grade = 90% of score.
1 day late = 80 % of grade
over 1 day late = no homework credit, put in folder for lab requirement only.

Bonus: a teacher may announce an occasional bonus activity to earn extra points on a lab report.

Copying: Procedures and conclusions should be original compositions. All credit will be lost if either of these sections is deemed copied (identical work) in the teachers judgment.

Laboratory Notebook (scrap copies) should never be removed from the laboratory notebook. If a student hands in a scrap copy from his or her laboratory notebook it will not be accepted for homework credit. The laboratory notebook will be graded twice a year as part of the notebook-folder check, and missing scrap labs will lower that grade. Students will not get homework credit for scrap copies, but scrap copies can be brought up to a satisfactory level and used to document 30 hours of lab time if needed for Regents qualification at the end of the year.

Lab reports should always be written in the PAST TENSE, PASSIVE VOICE.
This means:

PAST TENSE Dont use: is, are Use: WAS

Dont give directions like
"First you weigh the beaker"
(This is directions for the future)
Say instead:
"First the beaker was weighed"

Practice:
Dont say "Boil off the water, then collect the calcium hydroxide and weigh it"
Say

PASSIVE VOICE: also called writing in the "third person" or "impersonal style". When writing in the impersonal style, the experimenter never makes reference to himself. He never says "I did this" or "I did that". Instead he says "This was done" or "That was done".

Dont use : I, me, my, him, her
Never refer to yourself or a collaborator.
Instead: talk about what was DONE TO the THINGS in each step of the experiment

Practice:
"I weighed the bottle"
becomes " The bottle was weighed"

NOTICE: "The SUBJECT of the sentence changes fom "I" to the "bottle". No one cares about "I" in scientific writing; they care about "the bottle".

1. "I poured the water that I got from the tap into the bottle."

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2. "Put the calcium into the beaker"

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3. "My calculations showed that my error was very small"

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4. " You begin the experiment by weighing your dry empty beaker"

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5. " I think that the compound formed might be zinc sulfide, but then again you never can tell".

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6. "Now you carefully heat the beaker until most of the water is almost gone. Then turn off the gas and let it evaporate until it is dry."
